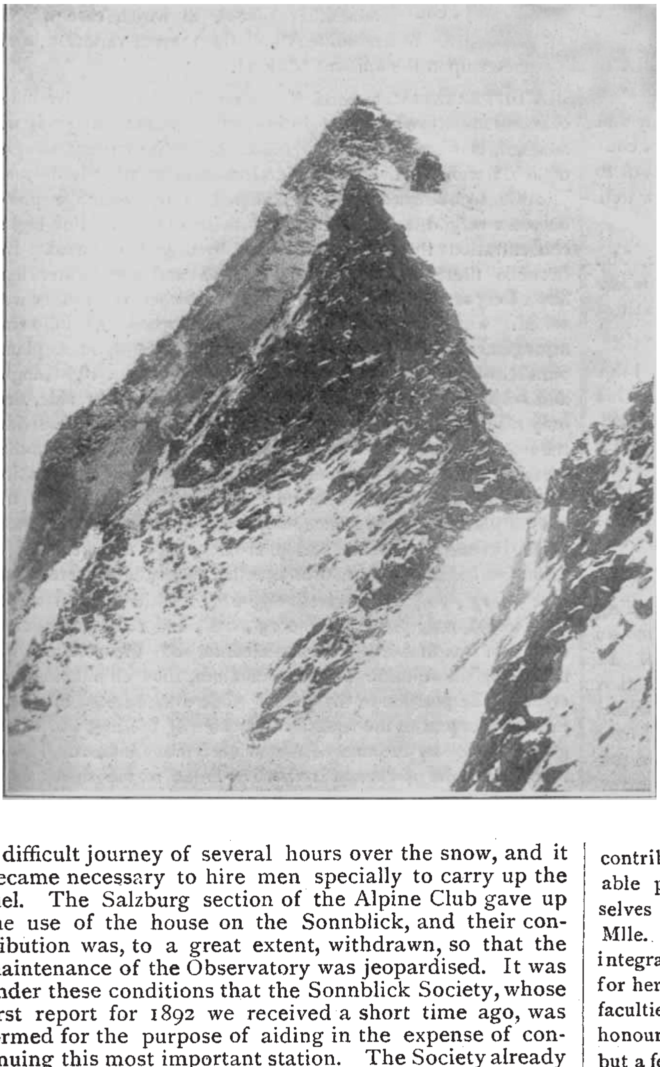
site and to carry out successfully the construction of the building. Dr. J. M. Pernter has given a graphic description of the difficulties of an ascent which he made in February 1888 (NATURE, vol. xlii. p. 273), during which the foremost guides sank to their hips at every step, despite their use of snowshoes. The maintenance of the station in winter was a matter of great difficulty; but it was materially facilitated by the fact that the Miners' House workmen were at hand for the conveyance of fuel and for carrying out any necessary repairs. But in the year 1888 Rojacher was compelled, from failing health, to sell the mine, and in 1889 operations were discontinued; he succumbed in January, 1891, and then Kolm was abandoned altogether. Under these circumstances, the difficulty of continuing the Sonnblick Observatory was increased. The observer could not remain alone on the summit, separated from all human communication by a difficult journey of several hours over the snow, and it became necessary to hire men specially to carry up the fuel. The Salzburg section of the Alpine Club gave up the use of the house on the Sonnblick, and their contribution was, to a great extent, withdrawn, so that the maintenance of the Observatory was jeopardised. It was under these conditions that the Sonnblick Society, whose first report for 1892 we received a short time ago, was formed for the purpose of aiding in the expense of continuing this most important station. The Society already numbers 280 members, and, in addition to several other contributions, receives considerable subventions from the Austrian Government and the Committee of the German and Austrian Alpine Club.



Since the establishment of the Observatory in 1886, several valuable discussions on the conditions of the atmosphere in the higher regions have emanated from the pen of Dr. Hann and others, and these have already materially modified the prevalent ideas relative to the nature and origin of storms. In the present report Dr. Hann gives a general account of the climate deduced from observations taken up to the present time. From this it is seen that in each winter the temperature has fallen below minus 22°, and in March, 1890, it fell to minus 30°·3. The warmest month is August with a mean temperature of 33°·6, and the coldest month is February, mean temperature 5°·5. The precipitation is mostly in the form of snow; even in the six summer months, May to October, fully 85 per cent. of the fall consists of snow; out of about 200 wet days in the year, rain only fell on 21 days, and then it was often a kind of sleet. The greatest rainfall measured in one day was 2·8 inches on September 1, 1890. The amount of cloud is perhaps of most importance to tourists; this is most prevalent in June and least in December, just the opposite to what obtains in the lowlands. The month of June has only a quarter of the possible amount of sunshine, while in December it has about half the possible amount. Thunderstorms are less frequent on the Sonnblick than in the lower regions, and generally are not so severe. The Observatory is protected by a properly erected lightning conductor, and contains a room suitable for anyone who may wish to carry on researches at a great altitude. This room is entirely reserved for scientific purposes; another apartment, capable of accommodating twenty persons, has been provided for ordinary visitors. The Sonnblick Society deserves the thanks of all meteorologists for carrying on the work in their Observatory. The establishment of the mountain station has led to the elucidation of many obscure problems, and still more important results can confidently be expected.

NOTES.

MLLE. KLUMPKE, who has just gained the degree of Doctor in Mathematical Sciences at the Sorbonne, is the first lady who has obtained that distinction. The full title of her thesis was "Contribution à l'étude des anneaux de Saturne," and the following is a translation from *La Nature* of the complimentary terms in which M. Darboux addressed the gifted authoress in granting her the degree:—"You have occupied yourself with one of the most interesting questions in astronomy. The great names of Galileo, Huyghens, Cassini, and Laplace, without speaking of those of my illustrious colleagues and friends, are connected with the history of each of the great advances in the attractive but difficult theory of the rings of Saturn. Your work is not a slight contribution to the subject, and it places you in an honourable position among the ladies who have devoted themselves to the study of mathematics. During last century Mlle. Marie Agnesi gave us a work on the differential and integral calculus. Since then Sophia Germain, as remarkable for her literary and philosophic talent as for her mathematical faculties, was held in esteem by the great geometers who honoured our country at the beginning of this century. And but a few years ago the Academy of Sciences, on the report of a commission in which I had the honour to take part, awarded one of its best prizes to Mdme. Kowalewska, placing her name by the side of those of Euler and Lagrange in the history of discoveries relating to the theory of the movement of a solid body around a fixed point. In your turn you have entered upon your career. We know that for some years you have devoted yourself with great zeal and success to investigations connected with the star-chart. Your thesis, which you have prepared according to our course of higher mathematics, with an assiduity that we could not ignore, is the first that a lady has presented and successfully sustained before our Faculty to obtain the degree of Doctor of Mathematical Sciences. You have worked in a deserving manner, and the Faculty has unanimously decided to declare you worthy of the grade of Doctor."

M. Marey has accepted the Presidency of the French Photographic Society, in succession to Dr. Janssen, who has retired after completing his full term of office—three years.

The *British Medical Journal* says that a branch of the Pasteur Institute will be established at Algiers next year.

The death is announced of Dr. E. Lellmann, Professor of Chemistry at Giessen University.

We regret to announce that Prof. A. Sprenger, the celebrated orientalist, died on December 19, at the age of seventy-five.

Mr. W. L. H. Duckworth has been elected to a Natural Science Fellowship at Jesus College, Cambridge. The new Fellow took a First Class in both parts of the Natural Science Tripos (1892–93), attaining distinction in Human Anatomy and Anthropology, and has published several papers on points connected with these sciences. His election is creditable both to his College and to the rising School of Anthropology which Prof. Macalister has founded in Cambridge.

The *University Correspondent* says that the late Mr. Alexander Low Bruce, son-in-law of Dr. Livingstone, the explorer, has left £3,000 for the purpose of founding a Chair of Public Health in the University of Edinburgh.

The Franklin Institute has awarded the following John Scott Legacy Medals and Premiums:—Mr. J. B. Edson, for his invention of a pressure-recording gauge; Mr. N. W. Perry, for his system of series electric traction for railways; Mr. J. T. Wilkin, for a method and apparatus for generating cycloidal surfaces; Mr. W. F. C. Morsell, for an application of polarised light to the systematic study of colour and crystal patterns for design, and Mr. F. Shuman, for his machine and process for embedding wire-netting in glass.

The report of the Meteorological Council for the year ending March 31, 1893, which has recently been issued, contains an account of the progress in the various discussions in hand. In the branch of ocean meteorology, much valuable information has been added to the current charts for the Atlantic, Pacific, and Indian oceans, from the log-books of H.M. ships, and from data furnished by Foreign Governments. The latter observations are mostly for the Pacific Ocean, where they are comparatively scarce. For another investigation, the district between the Cape of Good Hope and New Zealand, all available data have been dealt with in the construction of monthly charts of the various elements, and the council have decided that the next district to be discussed shall be the South Atlantic. The work in the branch of weather telegraphy and forecasts continues to increase; comparisons of the results of forecasts issued during the hay harvest season, and of those regularly issued at night for the morning newspapers, show respectively a success of 88 and 79 per cent., taking an average of all districts, but for some localities the success was considerably higher. The work included under the climatology of the British Isles is steadily continued, and among the various investigations may be mentioned a discussion of the results of the harmonic analysis of the daily curves for temperature at the observatories, which has been laid before the Royal Society by General R. Strachey, chairman of the council, and of which an abstract is given in the report. Among the miscellaneous subjects we notice a description of a proposed new form of pressure gauge, which is the outcome of the investigations on wind measurements that have been carried out by Mr. W. H. Dines; and, also, that the council have commenced the regular tabulation of the hourly values of sunshine for seven observatories, since the year 1881. The results of an inquiry into fog observations, by Mr. Scott, for the years 1875–90, have been published by the Royal Meteorological Society.

At the meeting of the French Meterological Society on December 5, M. Angot stated that while investigating the diurnal range of the amount of cloud at Paris, and representing it by a harmonic series, he had found that the semi-diurna period showed a range absolutely opposite to that of the diurnal variation of the barometer, so that the maximum of the semi-diurnal period in the amount of cloud corresponded to the minimum of pressure, and *vice versa*. We agree with M. Angot that it would be interesting to find whether the same relation holds for other places, in which case a proof would be given of the influence of the diurnal variation of the barometer upon the amount of cloud.

A differential method of determining the refractive index of solutions to which the interferential refractometer is not adapted, is described by W. Hallwachs in the current number of *Wiedemann's Annalen*. The former instrument is only applicable to measurements of differences of refractive power between very dilute solutions and their solvents. For higher concentrations the prism method has been generally used. But between these degrees of concentration and the former there lies a long series of solutions to which neither method is well suited. For these, Mr. Hallwachs has adopted the following arrangement. A beam of sodium light falls upon a plane-parallel plate of glass at an incidence of nearly a right angle, and is refracted into the glass and out on the other side, thus only skimming the surface on one side. The glass plate divides the solution from the solvent, and stands at right angles to another vertical plane-parallel plate, the two forming a combination in the form of a T. The beam traverses the solution and the second plate, and emergence at an angle with the first plate, which is read by a scale and micrometer. For differences of refractive index of 0·001, 0·005, and 0·1 the angles were in one case 6°, 13°, and 63° respectively, where with a prism of 60° they would only have been 0·15°, 0·8°, and 16°. In practice, the beam was first sent from the medium into the solution, and then from the solution into the medium, thus eliminating any errors in the position of the plates. The difference of refractive index was equal to the square of the sine of the angle of emergence divided by the sum of the two refractive indices. It was found that the molecular refractive index of the substance is decidedly affected by changes in concentration, accompanied by changes of molecular volume, while the specific refractive power of the substances is, curiously enough, very little disturbed. It appears that the effects of dissociation chiefly influence the density.

For some weeks there have been appearing in the *Electrician* accounts of devices for compensating the effects of hysteresis of the iron which is used in measuring instruments. The current number of that journal contains a short account, by Messrs. Field and Walker, of some experiments they have made, at Prof. Perry's suggestion, with this object in view. The principle of the method employed is to place a piece of hard magnet steel as a shunt between the poles of the electromagnet used in the instrument. When the magnetised current is passing, some of the lines of force pass through this shunt. When the current is broken, the lines of force in the air gap, due to the residual magnetism in the electromagnet and in the hard steel, will be in opposite directions, and by suitably proportioning the length and section of the steel, it is possible to arrange that the two residual magnetisms shall just neutralise each others effect in the air gap. A rather novel method was employed to measure the current. A small rectangular tunnel was made in an ebonite plate, placed between the pole-pieces of the electromagnet, connecting two large flat cylindrical vessels, one of which communicated with an almost horizontal glass tube. Electrodes were fixed on opposite sides of the tunnel, at the part of the field it was required to measure, so that a current could be passed across the tunnel. Under these circumstances, when there was a magnetic field between the pole-pieces, on passing a current between these electrodes and through the mercury, the mercury tended to flow from one of the cylinders to the other. A little alcohol placed above the mercury in the one cylinder flows along the inclined tube, and by its position indicates the pressure exerted by the mercury. The current through the mercury being constant, the pressure is proportional to the strength of the field. The authors say that by the above means it is possible to obtain visible readings for minute variations of the field, whether it be strong or weak.

IN the Proceedings of the Boston Society of Natural History, vol. xxvi. July, 1893, we note that Mr. Warren Upham reasserts his theory of the formation of drumlins in the neighbourhood of Boston. He now brings forward as confirmatory evidence the occurrence of deflected glacial striæ in Somerville, north-west of Boston. Mr. Upham's theory, which was fully expressed a year ago (Proc. B.S.N.H. vol. xxvi. December, 1892), supposes a rapid accumulation of the drumlins taking place during a period of rapid melting of the ice-sheet. Such periods were episodal occurrences, followed temporarily by readvance of the ice or cessation of its melting; they mark the oscillatory nature of the influences which brought about the final recession of the ice from these areas. The material forming the drumlins was primarily collected by the ground-ice carried upwards through the ice-sheet as a result of the differential velocities of flow in the superficial and ground-ice. It became, after tracing a steep parabolic curve, part of the super-glacial drift, and began then a slowly descending movement, owing to surface-melting during the retreat of the ice. As the superficial drift was washed onwards and downwards over the melting ice, it was gradually transformed into true till. If now an advance of the ice-sheet took place, the super-glacial and englacial drift would be caught between a more rapidly-moving upper current of ice and a thin lower stratum of slowly-moving ice. The drift would suffer, therefore, from shearing movements, and be gathered into great lenticular masses, or sometimes long ridges, of drumlins, probably farther altered and added to before their final exposure. These are the main arguments of Mr. Upham's theory, to several of which grave objections have already been made by Prof. Davis, Mr. G. H. Barton, and others.

IN *Petermann's Mitteilungen*, November, 1893, a coloured map is published in illustration of Sir Thomas Elder's Australian Expedition of 1891–92. The map is reduced from the original to scale 1 : 3,000,000. The routes of travel, the stations at which the various observations were taken, and the geographical features of the country traversed, are all fully entered. The editor gives a brief statement of the objects of the expedition and its attendant success (pp. 269–270).

A WRITER in "Insect Life" (vol. vi. No. 1.), issued by the U.S. Department of Agriculture, describes a remarkable example of mimicry by a spider. At Jamesburg, N.J., in August of this year, his attention was drawn to what was apparently a gall, perfectly formed, and growing upon the upper surface of a leaf of a small oak tree. On handling the leaf, however, the supposed gall rolled off, and when it was picked up was found to be in reality a spider (*Ordgarius Cornigerus*, Hentz) which had been resting on the leaf, its curiously formed abdomen simulating exactly both in form and colour the common oak gall, even to the tiny punctures through which the gall insect makes its exit when mature.

GUSTAV EISEN has commenced the description of the earthworms of California; though a dry and rainless country for six months in the year, it still would seem to possess a worm fauna rich both in species and individuals. With the exception of two very imperfectly described species by Kinberg, no true earthworms have been recorded from this part of the world. While reserving a detailed account for the Transactions of the Californian Academy, Mr. Eisen gives diagnoses of Deltania, a new genus near Microscolex, with three new species; *D. elegans* (pretty widely diffused, and the largest species of the genus, being from two to four inches in length); *D. troyeri* (from Golden Gate Park, San Francisco); and *D. benhami* (Alameda County). Argilophilus is a new genus near Plutellus; *A. ornatus*, n. sp., is the most common earth-worm of the region, aud *A. papillifer*, n. sp., is a more southern form. (*Zoe* for October, 1893, vol. iv. p. 248.)

THE current number of *Danckelman's Mittheilungen* contains an account of an exploring trip made to the upper regions of Togo, between the years 1890 and 1892, by Captain E. Kling and Dr. R. Büttner. Copious extracts from Captain Kling's diary of his journey are given, with sketches of the features, tattoo marks, and head-dresses of the various tribes of natives he met with; there is also figured a hobby-horse played with by the children, which was made from a strong stalk of millet (in the drawing it looks like a bamboo cane), the head of a horse with ears and bridle being carved out of the root. Very extensive collections of the natural history of the countries visited were made, and astonishingly complete details, considering the time that has elapsed since the specimens were received in Berlin, are given. The lists of the mammals, reptiles, and amphibia of the Togo district are by P. Matschie, the birds of the environs of Bismarckburg are named by Dr. Ant. Reichenow, the fish and crustacea by Dr. F. Hilgendorf, the mollusca by Prof. E. Martens, the insects by Drs. H. Stadelmann and F. Karsch and H. J. Kolbe, the worms by A. Collin. The collection of plants has been only in part worked out, about 560 flowering plants species of were found, and a small number of ferns, lichens, and fungi. In a series of thirteen plates made from photographs taken by Dr. R. Büttner, there are views of Bismarckburg, of the natives of Adeli, Bimbila, &c. With investigations like these in addition to those pursued by our own countrymen, the tropical parts of Africa will soon be better known than the northern regions of the continent which lie within the sight of Europe.

THE order of the Laminariaceæ is one of the most distinct and well defined among the Phæosporeæ, the members of this order of sea weeds are all of comparatively large size, while the species of Macrocystis reach a length, even surpassing that of some tropical "climbers," and those of Lessonia possess stems which in appearance resemble the trunks of some trees. Since the date (1848) of J. G. Agardh's "Species Algarum" no attempt has been made to classify the numerous genera of this order, but in a very interesting memoir on the classification and geographical distribution of the Laminariaceæ, by W. A. Setchell, which appears in a recent number of the Transactions of the Connecticut Academy (vol. ix. 1893), we find the order divided into three tribes: I. Laminariideæ, with (1) Laminarieæ, containing the three genera, Chorda, Saccorhiza, and Laminaria; (2) Agareæ, with Agarum, Thalassiophyllum, Costaria, Cymathære, and perhaps Arthrothamnus. II. Lessoniideæ, with (1) Lessonieæ and the genera Dictyoneuron, Lessonia, Postelsia, and Nereocystis; (2) Macrocysteæ, with Macrocystis. III. Alariideæ, with (1) Alarieæ, containing Alaria and Pterygophora; (2) Ecklonieæ with Ulopteryx, Ecklonia, and Eisenia; (3) Egregieæ with Egregia. A synopsis of these nineteen genera is given, and also a list of all the known species with localities. The Laminariaceæ are inhabitants of the colder waters of the globe, it is the summer temperature which seems to act as a limit to their distribution, as heat not cold is inimical to their growth, they can endure almost any degree of cold that occurs even in polar seas, but speedily die away where the waters are at all warm.

IN support of his theory that the toxic products elaborated by pathogenic bacteria partake of the nature of ferments, Dr. Uschinsky (*Centrlb. f. Bakt.* 1893) quotes some very interesting experiments made by Courmont and Doyon, published in two lectures given before the Société de Biologie in March and June last. These investigators, in their studies on tetanus-poison, point out that the toxic action of this material is not hastened by greatly increasing the quantity of toxine introduced into an animal. Thus 200 c.c. of the filtrate obtained from a tetanus-broth-culture were injected into the blood of one dog, and from 3-4 c.c. of the same filtrate into another dog; in both cases tetanus symptoms developed on the third day after the injection. These investigators also state that they were able to induce symptoms of tetanus in animals, by simply injecting some of the blood derived from an animal rendered tetanic as above, similar results being also obtained with muscle-extract. That the quantity of the toxine introduced into the system of an animal does not influence the ordinary period of incubation characteristic for each variety of animal, was confirmed by experiments made by Dr. Uschinsky on rabbits; for by the injection of from 40-50 times the usual quantity of tetanus-toxine into these animals, he was not able to hasten the appearance of the tetanus symptoms. On the other hand, he failed to confirm the remaining results obtained by Courmont and Doyon, for on injecting 6-7 c.c. of the blood of rabbits suffering from tetanus into guinea-pigs and frogs, no symptoms of tetanus made their appearance in these animals. It is possible, however, that the French investigators used larger quantities of tetanus blood for their inoculations, and that this may account for the divergence in the results obtained.

Two contributions have recently been made towards the ætiology of the particular form of nervous disease known as delirium acutum. Early in the year Prof. Bianchi and Dr. Piccinino published a paper in the Transactions of the R. Accad. Med.-chirurg. of Naples, entitled "Sull'origine infettiva di una forma di delirio acuto," and in the *Centralblatt f. Bakteriologie*, vol. xiv. No. 16, Dr. Rasori has described the results of his observations on the ætiology of a particular case of delirium acutum which passed into his hands in the Bologna lunatic asylum. The investigations were, however, carried out in Prof. Tizzoni's laboratory, and under his direction. The clinical aspect of the case suggested some source of infection as the primary cause of the disease, and at the autopsy some of the fluid underneath the dura mater was removed and inoculated into sterile bouillon and agar-agar respectively, and kept at 37° C. In both these media bacterial growths made their appearance, which were found to be due to a small bacillus, the microscopic and macroscopic description of which is shortly given. The next step was to ascertain if this organism was endowed with pathogenic properties, and for this purpose $\frac{1}{4}$ c.c. of a pure culture in broth of the bacillus was introduced, with the usual rigid antiseptic precautions, under the dura mater of a healthy rabbit. This animal died in two days, and the bacillus was found in large numbers in the blood and in the marrow taken direct from the brain and spinal cord. Similar results were obtained when the organism was introduced subcutaneously or into the nasal membrane, the bacillus being detected in the nerve substance as well as in the blood of the animal. The organism was, therefore, possessed of virulent pathogenic properties, being able to exist and multiply in the body of the rabbit, and by elaborating some toxic substance to induce its death in from one and a half to six days, according to the point selected for inoculation. Dr. Rasori, in making this preliminary communication, reserves to himself the task of trying to trace out the special circumstances which favour this bacterial infection, and the manner in which it may gain access to the human subject.

AN excellent photograph of the late Prof. Tyndall appears in Part 52 of "The Cabinet Portrait Gallery," published by Messrs. Cassell & Co., and is accompanied by a sketch of his career.

IN a Supplementary Paper, just issued by the Royal Geographical Society, Messrs. D. G. Hogarth and J. A. R. Munro give an account of "Modern and Ancient Roads in Eastern Asia Minor."

WE have received the *Monthly Weather Review* for July, 1893, prepared under the direction of Mr. A. Pedler, F.R.S., meteorological reporter to the Government of India.

THE third volume of Prof. Blake's "Annals of British Geology," 1892 (Dulau and Co.), has appeared. In previous volumes an objectionable feature was the insertion of criticisms among the abstracts of papers, but in this Prof. Blake's opinions are collected together in the form of an introductory review. We are afraid that the following extract from the preface heralds the death of the "Annals": "On the reception accorded to the present volume depends the continuance of the publication; the experimental stage is ended. The co-operation, therefore, is invited of all those who desire a record of geological literature of any kind, for the 'Geological Record' having fallen through, and the 'Year Book of Science' being discontinued, if these 'Annals' cannot be put on a firm basis the only remaining hope would be that the Geological Society should undertake a 'Record' at their own expense, by the aid of paid recorders."

AT the November meeting of the Institution of Engineers and Shipbuilders in Scotland, Prof. J. H. Biles read a paper on "The Strength of Large Ships," in which he gave the results of a series of calculations undertaken with a view of determining the relative stresses upon ships of more than 400 feet in length. Capt. J. Bain gave an account of experiments made with six large screw steamers to test "The Effect of Reversing the Screw of a Steamship upon the Steering." His experiments lead him to the following conclusions:—(1) If the helm is put hard aport on board a screw steamer, with a right-handed propeller, going full speed, or nearly full speed, ahead, and at the same instant the engines are reversed full speed, her head (provided there are no disturbing influences present) will cant to port instead of to starboard. (2) If the helm is put, or rather allowed to run hard astarboard, the instant the engines are reversed full speed ahead her head will cant to starboard as if *on a pivot*. (3) If a steamer, with a right-handed screw, going full speed ahead, has another vessel close to on her starboard bow, and in trying to clear her the helm is put hard astarboard and the engines reversed full speed, a collision is almost certain. With regard to the *Victoria* disaster Capt. Bain says: Had both the vessels started from their respective divisions at, say, under half speed ahead, with the port screw reversed on board the *Victoria*, and the starboard screw reversed on board the *Camperdown*, while the other screw on each of them was kept at full speed ahead, the collision would have been averted.

A FURTHER communication concerning the explosive metallic derivatives of acetylene is contributed to the *American Chemical Journal* by Dr. Keiser. He has previously shown that the compounds obtained by the action of acetylene upon ammoniacal solutions of cuprous chloride and silver nitrate possess the composition C_2Cu_2 and C_2Ag_2, and that they are to be regarded as substitution products of the hydrocarbon. The action of acetylene upon aqueous and alkaline solutions of mercuric salts has since been studied, and the results are now published. When acetylene acts upon silver nitrate, either in aqueous or ammoniacal solution, the same product, C_2Ag_2, appears to be produced. But in the case of mercuric salts the action appears to be essentially different in aqueous and alkaline solutions. When acetylene is led through a solution of mercuric chloride in water, a white granular precipitate is produced, which is not explosive after drying, and which does not dissolve in dilute acids with evolution of acetylene gas. This compound contains chlorine, and is represented by the formula $C_2(HgCl)_2$. If, however, acetylene is passed into an alkaline solution of a mercuric salt, such as Nessler's solution, mercuric iodide dissolved in potassium iodide with the addition of caustic potash, a white flocculent precipitate is obtained, which when dry is extremely explosive and dissolves in dilute hydrochloric acid with evolution of acetylene. It is analogous in all its properties to the silver and copper compounds, and is a metallic substitution product of the same type, C_2Hg. This compound can only be obtained in the pure state by the use of pure acetylene, such as that prepared by treating ethylene dibromide with alcoholic potash. Decomposition of the substance commences at about 100°, and when it is rapidly heated to a temperature slightly higher than this it explodes with extreme violence, leaving a small residue of finely divided carbon and mercury. It is particularly interesting to learn that when the substance is treated with an alcoholic solution of iodine it unites with the latter, slowly even at the ordinary temperature and rapidly at the temperature of a water-bath, forming di-iodo-acetylene, C_2I_2. This compound upon standing a short time polymerises, and the polymer separates in the form of crystals which melt at 187° and appear to be hex-iodo-benzene, C_6I_6.

IN the course of an investigation concerning the atomic weight of copper, Messrs. Richards and Rogers, of Harvard University, have observed that cupric oxide prepared by ignition of the nitrate always contains a considerable amount of occluded gas, chiefly nitrogen, while that prepared from the carbonate invariably shows no sign of occluded gas. This fact is of considerable importance inasmuch as the previous determinations of the atomic weight of copper are affected by it and will be rendered more or less inaccurate. It is no new observation, however, for it was pointed out by Frankland and Armstrong as long ago as 1868, but appears to have been largely overlooked. The Harvard chemists show, moreover, that the phenomenon is also exhibited by oxides of zinc, nickel, and magnesium, when prepared by ignition of the nitrate. In the case of magnesia the amount of occluded gas is extraordinarily large, exceeding a hundred cubic centimetres from ten grams of oxide. Hence it is considered necessary that the atomic weights of these metals should be subjected to revision, taking account of these facts, and until this is done the values hitherto accepted can only be considered as approximate.

THE additions to the Zoological Society's Gardens during the past week include a Mona Monkey (*Cercopithecus mona*, ♀) from West Africa, presented by Mrs. Frances Bell; a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. Henry Vane; three Black-backed Jackals (*Canis mesomelas*) from South Africa, presented by Mr. J. Matcham; four Bernicle Geese (*Bernicla leucopsis*, 2 ♂, 2 ♀) European, a Variegated Sheldrake (*Tadorna variegata*) from New Zealand, presented by Sir Henry Peek, Bt.; a Little Auk (*Mergullus alle*) British, presented by Mr. J. W. C. Stares; two Adorned Ceratophrys (*Ceratophrys ornata*) from Buenos Ayres, presented by Miss Mildred FitzHugh; a Mozambique Monkey, (*Cercopithecus pygerythrus*) from East Africa, deposited; six Smooth-clawed Frogs (*Xenopus lævis*) hatched in the Gardens.

OUR ASTRONOMICAL COLUMN.

SMALL DISTANCES MEASURED WITH THE HELIOMETER.—As the filar micrometer measures very precisely distances of a few seconds, so with equal accuracy does that important of modern instruments, the heliometer, measure distances ranging from a few minutes up to one or two degrees. With the former instrument one brings the thread (moved by the micrometer head) first to one side of the star and then to the other; or, if one has two threads, one places the star half-way between them, and thus reads off the distance. With the heliometer the distances are read off the scale at the object-glass end (from the eye end), the images of the two stars cast by the movable half of the object-glass being placed symmetrically first on one, and then on the other side of the images from the fixed half.

In the measurement of small distances with the heliometer it has been found that nearly every observer measures the distances too small, thus a small positive correction has to be applied to the observations. As an instance of the magnitude of the corrections to be added or subtracted for various distances, we give the following table:—

Mean distance	CAPSTADT.			Yale Obs.	GÖTTINGEN.	
	Gill.	Finlay.	Jacoby.	Chase.	Schur.	Ambronn.
″	″	″	″	″	″	″
1000	+0·03	+0·07	+0·18	+0·14	+0·20	+0·14
2000	+0·01	0·00	+0·13	+0·08	+0·03	+0·02
3000	+0·01	−0·04	+0·13	+0·08	+0·09	+0·11
4000	+0·01	0·00	0·00	−0·01	−0·08	−0·11
5000	−0·06	−0·05	−0·15	−0·10	−0·01	−0·15
6000	−0·04	−0·13	−0·21	−0·18	−0·12	−0·22
7000	0·00	−0·12	−0·12	−0·08	−0·07	−0·21

The necessity of such a correction has long been known, but its cause is yet unexplained, although suggestions, such as that of Dr. Gill, have been put forward. In *Astronomische Nachrichten*, No. 3197, Prof. Wilhelm Schur gives an interesting account of his investigations, which had for their aim the determination of the source of this error. Observations showed him that the explanation suggested some time back by Dr. Gill was not valid, at any rate for the Göttingen heliometer; it was finally thought that an explanation might be found by supposing an irregular guidance to occur to those parts of the instrument which carry the objective, but on investigation it was found that such was most improbable. Irregularity in the objective slides themselves was also eliminated, as the magnitude of the error necessary to produce such a large difference in the distance measured was too large to be at all considered. In the paper Prof. Schur is led to discuss some of the measurements made in the triangulation of the Præcipe, and he refers to the method he adopted to bring all the measures into harmony. Three ways were open to him to satisfactorily accommodate the distances in this work, they being, in the measurements of the three arcs, the employment of quantities which are too small to be of no account in the measures of distances in the large quadrilateral. Development of the formula on the assumption (as the observations indicate) that at the distance 1300″ a maximum in the correction occurs, and for 0″ and 5000″ the "verbesserung" is 0, and a is assumed to be 0″·473. And lastly, the computation of the "verbesserung" after the expression 0″·264 s., which assumes a change in the scale value, which change, although inadmissible for large distances, brings, in the case of the distances here concerned, the measurements into a more satisfactory concord.